# FCC Test Report

Product Name	Access Point
Model No	PBE-M5-620
FCC ID	SWX-PBEM5

Applicant	Applicant Ubiquiti Networks.,Inc	
Address	12F, No. 105, Song Ren Rd., Sin Yi District, Taipei 110, Taiwan	

Date of Receipt	Aug. 05, 2014
Issued Date	Sep. 03, 2014
Report No.	1480170R-RFUSP41V00
Report Version	V1.0
TAF Testing Laboratory 0914	

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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## Test Report

Issued Date: Sep. 03, 2014 Report No.: 1480170R-RFUSP41V00



Product Name	Access Point	
Applicant	Ubiquiti Networks.,Inc	
Address	12F, No. 105, Song Ren Rd., Sin Yi District, Taipei 110, Taiwan	
Manufacturer	Ubiquiti Networks.,Inc	
Model No.	PBE-M5-620	
FCC ID.	SWX-PBEM5	
EUT Rated Voltage	DC 24V (Power by POE)	
EUT Test Voltage	AC 120V/60Hz	
Trade Name	UBIQUITI	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2014	
	ANSI C63.10: 2009	
	789033 D02 General UNII Test Procedures New Rules v01	
Test Result	Complied	

Documented By :

:

:

Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By

Dan Chen

(Engineer / Alan Chen)

Approved By

( Director / Vincent Lin )

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## 1. GENERAL INFORMATION

## **1.1. EUT Description**

Product Name	Access Point	
Trade Name	UBIQUITI	
FCC ID.	SWX-PBEM5	
Model No.	PBE-M5-620	
Frequency Range	802.11a/n-20MHz:5745-5825MHz	
	802.11n-40MHz:5755-5795MHz	
Number of Channels	802.11a/n-20MHz: 5, n-40MHz: 2	
Data Rate	802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps	
Channel Control	Auto	
Type of Modulation	802.11a/n:OFDM, BPSK, QPSK, 16QAM, 64QAM	
Antenna type	Dish Antenna	
Antenna Gain	Refer to the table "Antenna List"	
Power Adapter (POE)	MFR: UBIQUITI, M/N: GP-A240-050G	
	Input: AC 100-240V~50/60Hz MAX0.3A	
	Output: DC 24V, 0.5A	

## Antenna List

No.	Manufacturer	Antenna type	Peak Gain
1.	UBIQUITI	Dish Antenna	31dBi for 5.725~5.85GHz
2.	UBIQUITI	Dish Antenna	29dBi for 5.725~5.85GHz

Note: 1. The antenna of EUT is conform to FCC 15.203.

2. Only the higher gain antenna was tested and recorded in this report.

802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel Frequency Channel Frequency Channel Frequency Channel Frequency Channel 149: 5745 MHz Channel 153: 5765 MHz Channel 157: 5785 MHz Channel 161: 5805 MHz Channel 165: 5825 MHz

802.11n-40MHz Center Working Frequency of Each Channel: Channel Frequency Channel FrequencyChannel 151: 5755 MHz Channel 159: 5795 MHz

- 1. This device is a Fixed Point-to-point Access Point including an IEEE 802.11 a/n WLAN transceiver.
- 2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report. (802.11a is Chain A, 802.11n is Chain A+ Chain B )
- 4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps, 802.11n-20BW is 14.4Mbps, 802.11n-40BW is 30Mbps)
- 5. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1: Transmit (802.11a-6Mbps)
	Mode 2: Transmit (802.11n-20BW-14.4Mbps)
Mode 3: Transmit (802.11n-40BW-30Mbps)	

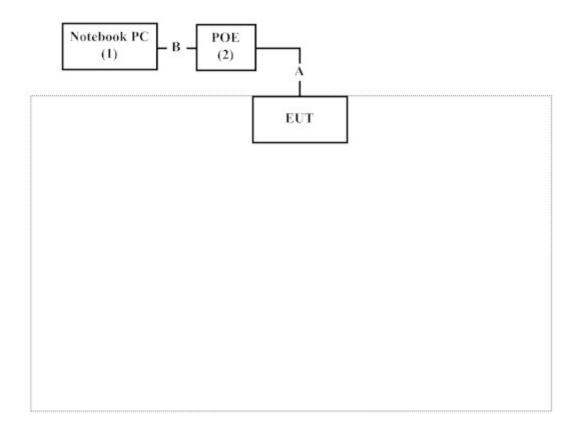
## **1.3.** Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Proc	duct	Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	РРТ	N/A	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description	
А	LAN Cable	Shielded, 1.8m	
В	LAN Cable	Shielded, 1.8m	

## **1.4.** Configuration of tested System



## **1.5.** EUT Exercise Software

- (1) Setup the EUT and peripherals as shown in section 1.4.
- (2) Execute "Art2-GUI V2.3" program on the Notebook PC.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Start the continuous transmission.
- (5) Verify that the EUT works properly.

## 1.6. Test Facility

	2	
Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Ambient conditions in the laboratory:

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <u>http://tw.quietek.com/modules/myalbum/</u>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/

Site Description: File on Federal Communications Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046 Registration Number: 92195

Site Name:	Quietek Corporation
Site Address:	No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
	Lin-Kou Shiang, Taipei,
	Taiwan, R.O.C.
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	E-Mail : <u>service@quietek.com</u>

FCC Accreditation Number: TW1014

## 2. Conducted Emission

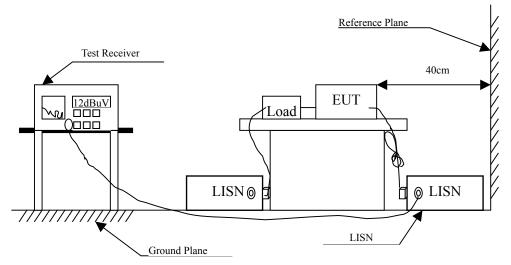
## 2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
Х	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2014	
Х	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2014	Peripherals
Х	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2014	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2014	EUT
Х	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2014	
	No.1 Shielded Room				

Note:

- 1. All equipments are calibrated every one year.
- 2. The test instruments marked by "X" are used to measure the final test results.

## 2.2. Test Setup



## 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit						
Frequency	Limits					
MHz	QP	AV				
0.15 - 0.50	66-56	56-46				
0.50-5.0	56	46				
5.0 - 30	60	50				

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

## 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product	:	Access Point
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps) (5755MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level Level		
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.162	9.746	41.260	51.006	-14.651	65.657
0.216	9.739	31.060	40.799	-23.315	64.114
0.255	9.741	26.190	35.931	-27.069	63.000
0.470	9.751	24.610	34.361	-22.496	56.857
0.744	9.763	22.090	31.853	-24.147	56.000
3.002	9.858	22.730	32.588	-23.412	56.000
Average					
0.162	9.746	25.870	35.616	-20.041	55.657
0.216	9.739	22.100	31.839	-22.275	54.114
0.255	9.741	15.570	25.311	-27.689	53.000
0.470	9.751	14.900	24.651	-22.206	46.857
0.744	9.763	8.560	18.323	-27.677	46.000
3.002	9.858	12.130	21.988	-24.012	46.000

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. "means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Product Test Item Power Lin Test Mod	ne : Line 2	ted Emission Test	n-40BW-30Mbps) (	5755MHz)	
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.158	9.747	41.100	50.847	-14.924	65.771
0.197	9.749	31.950	41.699	-22.958	64.657
0.220	9.750	28.780	38.530	-25.470	64.000
0.259	9.751	26.090	35.841	-27.045	62.886
0.658	9.759	24.590	34.349	-21.651	56.000
0.841	9.778	19.720	29.498	-26.502	56.000
Average					
0.158	9.747	33.490	43.237	-12.534	55.771
0.197	9.749	23.850	33.599	-21.058	54.657
0.220	9.750	2.580	12.330	-41.670	54.000
0.259	9.751	9.390	19.141	-33.745	52.886
0.658	9.759	10.100	19.859	-26.141	46.000
0.841	9.778	8.520	18.298	-27.702	46.000

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. " " means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

## 3. Maximun conducted output power

#### **3.1.** Test Equipment

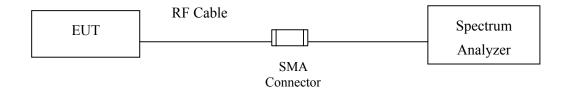
_	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Х	Power Meter	Anritsu	ML2495A/6K00003357	May, 2014
Х	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2014
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014
Note	2:			

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

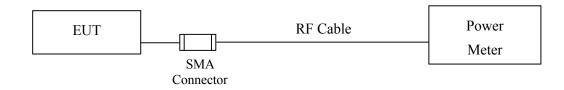
2. The test instruments marked with "X" are used to measure the final test results.

#### 3.2. Test Setup

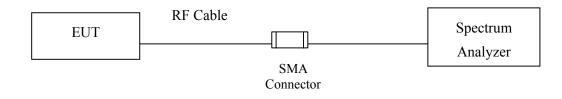
#### 26dBc Occupied Bandwidth



#### Conduction Power Measurement (for 802.11an)



#### Conduction Power Measurement (for 802.11ac)



## 3.3. Limits

(1) For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any

corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

## 3.4. Test Procedur

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater than 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW  $\leq$  40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter) <u>Note: the power meter have a video bandwidth that is greater than or equal to the measurement</u> <u>bandwidth, (Anritsu/MA2411B video bandwidth: 65MHz)</u>

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D01 section F) procedure is used for measurements.

## 3.5. Uncertainty

 $\pm$  1.27 dB

## **3.6.** Test Result of Maximum conducted output power

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)

#### CHAIN A

Cable	e loss=1dB	Maximum conducted output power		r						
				Γ	Data Rat	e (Mbps	5)			
Channel No.	Frequency (MHz)	6	9	12	18	24	36	48	54	Required Limit
			Measurement Level (dBm)							
149	5745	18.52								<30dBm
157	5785	16.47	16.41	16.35	16.29	16.23	16.17	16.11	16.05	<30dBm
165	5825	16.02								<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

#### CHAIN B

Cable	e loss=1dB	Maximum conducted output power								
				Γ	Data Rat	e (Mbps	5)			
Channel No.	Frequency (MHz)	6	9	12	18	24	36	48	54	Required Limit
149	5745	18.39								<30dBm
157	5785	16.32	16.26	16.20	16.14	16.08	16.02	15.96	15.90	<30dBm
165	5825	16.00								<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps)

#### CHAIN A

Cable	e loss=1dB		Max	kimum o	conduct	ed outpu	ut power	r		
			Data Rate (Mbps)							
Channel No.	Frequency (MHz)	14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	Required Limit
		Measurement Level (dBm)								
149	5745	16.89				-				<30dBm
157	5785	16.51	16.46	16.41	16.36	16.31	16.26	16.21	16.16	<30dBm
165	5825	16.02				-				<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

#### CHAIN B

Cable	e loss=1dB		Max	kimum o	conduct	ed outpu	ut powe	r					
			Data Rate (Mbps)										
Channel No.	Frequency (MHz)	14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	Required Limit			
				Measu	urement	Level (	(dBm)						
149	5745	16.39								<30dBm			
157	5785	15.91	15.80	15.69	15.58	15.47	15.36	15.25	15.14	<30dBm			
165	5825	15.71								<30dBm			

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

#### Maximum conducted output power Measurement:

#### (CHAIN A+ B)

Channel	Frequency	Chain A	Chain B	Output	Output Power
Number		Power	Power	Power	Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
149	5745	16.89	16.39	19.66	30
157	5785	16.51	15.91	19.23	30
165	5825	16.02	15.71	18.88	30

- 1. Power Output Value =Reading value on average power meter + cable loss
- 2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

Product	:	Access Point
Test Item	:	Maximum conducted output power
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps)

#### CHAIN A

Cable	e loss=1dB		Maximum conducted output power							
				Γ	Data Rat	e (Mbps	5)			
Channel No.	Frequency (MHz)	30	60	90	120	180	240	270	300	Required Limit
			Measurement Level (dBm)							
151	5755	18.01								<30dBm
159	5795	17.51	17.43	17.35	17.27	17.19	17.11	17.03	16.95	<30dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

#### CHAIN B

Cable	loss=1dB		Maximum conducted output power									
		Data Rate (Mbps)										
Channel No.	Frequency (MHz)	30	60	90	120	180	240	270	300	Required Limit		
		Measurement Level (dBm)										
151	5755	17.71								<30dBm		
159	5795	17.36	17.22	17.08	16.94	16.8	16.66	16.52	16.38	<30dBm		
	1 4 1 4	4	<b>X 7 1</b>	n	1.	1				111		

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

#### Maximum conducted output power Measurement:

#### (CHAIN A+ B)

Channel	Frequency	Chain A	Chain B	Output	Output Power
Number		Power	Power	Power	Limit
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
151	5755	18.01	17.71	20.87	30
159	5795	17.51	17.36	20.45	30

- 1. Power Output Value =Reading value on average power meter + cable loss
- 2. Output Power (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

## 4. Peak Power Spectral Density

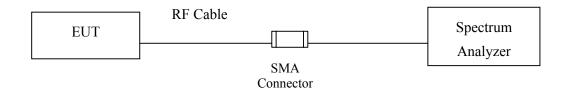
#### 4.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2014

#### Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

#### 4.2. Test Setup



#### 4.3. Limits

(1) For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated

transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations. (**iv**) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

## 4.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where BWCF =  $10\log (500 \text{ kHz}/100 \text{ kHz} = 6.98 \text{ dB})$ .

## 4.5. Uncertainty

± 1.27 dB

## 4.6. Test Result of Peak Power Spectral Density

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
149	5745	6	-1.120	6.98	5.860	<30	Pass
157	5785	6	-2.810	6.98	4.170	<30	Pass
165	5825	6	-3.370	6.98	3.610	<30	Pass

				Unan	Inci 14	/.				
Agilent Spectru	ım Analyzer - Swep	t SA								
KI RL	RF 50 Ω	AC		SE	VSE:INT		ALIGN AUTO	04:08:43 AM Au	29,2014	_
Center Fr	eq 5.745000	PNC	Z ): Fast 😱 in:Low	Trig: Free #Atten: 30		Avg Type	: Log-Pwr	TRACE 1 TYPE MY DET P	2 3 4 5 6 	Frequency
10 dB/div	Ref 20.00 di	Зm					Mkr1	5.744 004 -1.12		Auto Tun
										Center Fre
10.0				▲1						5.745000000 GH
0.00	NWW	willowshink	VpArandy		montheright	milan	malung	Jun.		Start Fre
10.0										5.732550000 GH
20.0	- Alan							1. No.		Otara Era
30.0	when							Mr. Mr. Marken	14.0	<b>Stop Fre</b> 5.757450000 GH
where									margh.	
40.0										CF Ste 2.490000 MH
50.0										<u>Auto</u> Ma
60.0										<b>Freq Offs</b>
70.0										01
/0.0										
Center 5.7 Res BW 1	4500 GHz		#VBW	300 kHz	1	1	Sweep	Span 24.9 2.40 ms (100	0 MHz	
ISG							STATU	1		6
							SIMIO	-		

#### Channel 149:



-	04:16:46 AM Aug 29, 2014	LIGNAUTO		SENSE:INT			Analyzer - Swept SA RF 50 Ω AC	RL
Frequency	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET PINNNNN	Log-Pwr	Avg Type	: Free Run en: 30 dB		GHz PNO: Fast 😱 IFGain:Low	5.78500000	enter Fr
Auto Tun	5.780 333 GHz -2.81 dBm	Mkr1				757	ef 20.00 dBm	0 dB/div
Center Fre 5.785000000 GH								10.0
						1		0.00
Start Fre 5.772587500 G⊦	m	mhaaluna	and the second sec	when we we we we	monin	share that any to be	man	0.0
<b>Stop Fre</b> 5.797412500 G⊦	Www.www.						willow with	0.0
<b>CF Ste</b> 2.482500 M⊢ <u>Auto</u> Ma	้างกับในกุ							0.0 0.0
Freq Offse 0 ⊢								0.0
								0.0
	Span 24.83 MHz 2.40 ms (1001 pts)	Sweep :		kHz	300 ki	#VBW		
		Sweep 3		kHz	300 ki	#VBW		Center 5.7 Res BW 1

Channel 157:

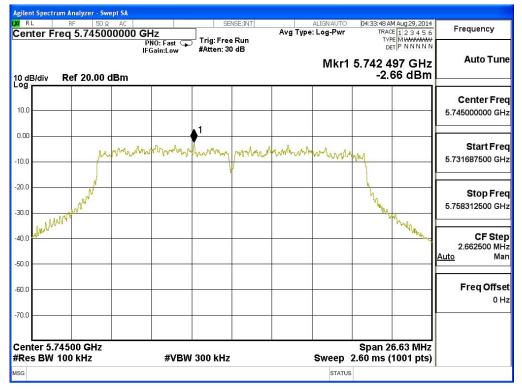
Channel 165:

RL RF 50 Ω AC		SENSE:INT	T	ALIGN AUTO	04:25:00 AM Aug 29, 2014	- Francisco
enter Freq 5.82500000	0 GHz PNO: Fast 😱 IEGain:Low	Trig: Free Run #Atten: 30 dB	Avg T	ype: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
dB/div Ref 20.00 dBm				Mkr1	5.821 265 GHz -3.37 dBm	Auto Tur
.0						Center Fr 5.825000000 GI
00 000 000 000 000 000 000 000 000 000	1 www.www.	www.	1 March	hprati <sup>n</sup> . NM rybright	hay	<b>Start Fr</b> 5.812550000 G
.0 .0					Mary Mary Mary	<b>Stop Fr</b> 5.837450000 G
.0					Mouthhand	CF St 2.490000 M <u>Auto</u> M
.0						Freq Offs 0
.0						
enter 5.82500 GHz tes BW 100 kHz	#VBW :	300 kHz	1	Sweep	Span 24.90 MHz 2.40 ms (1001 pts)	

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result		
140	5745	А	-2.660	6.98	7.330	<30	Pass		
149	49 5745	5745	5745	В	-4.830	6.98	5.160	<30	Pass
1.57	157 5785	А	-4.020	6.98	5.970	<30	Pass		
157		В	-5.670	6.98	4.320	<30	Pass		
1.65	5025	А	-4.850	6.98	5.140	<30	Pass		
165	5825	В	-6.040	6.98	3.950	<30	Pass		

Note 1: The quantity 10\*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

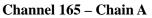


#### Channel 149 – Chain A

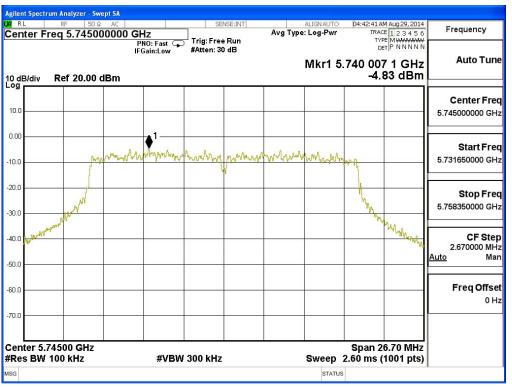


enter 5.78500 Res BW 100 kl			#VBW	300 kHz			Sweep	Span 26.70 Mi 2.60 ms (1001 pt	
70.0									_
0.0									Freq Offse
0.0 Alman Mark								Contemport	CF Step 2.670000 MH <u>Auto</u> Ma
20.0	W							hugen and	Stop Free 5.798350000 GH
0.00	Arthe	un and and and and and and and and and an	Mannan	month man	Manna	Withwith	hmanna	2024	Start Free 5.771650000 GH
10.0									Center Free 5.785000000 GH
dB/div Ref 2	20.00 c		Gain:Low	#Atten: ou			Mkr1 5	.780 007 1 GH -4.02 dB	z Auto Tun
enter Freq 5.	78500	Р	NO: Fast 😱	Trig: Free #Atten: 30		Avg Type	: Log-Pwr	TRACE 1 2 3 4 1 TYPE M WWWW DET P N N N I	Frequency

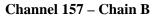
Channel 157 – Chain A







#### Channel 149 – Chain B







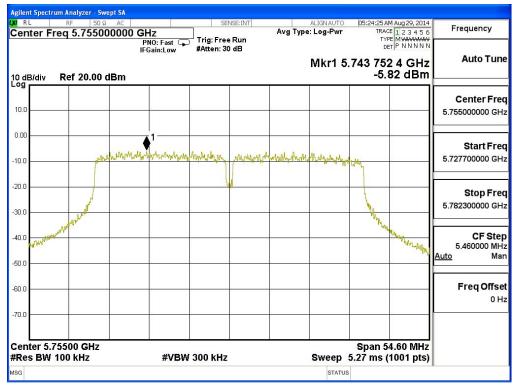
Chaimei 105 – Chai	
Agilent Spectrum Analyzer - Swept SA	
X         RL         RF         S0.0         AC         SENSE:INT         ALIGN,           Center Freq 5.82500000 GHz         PNO: East         Trig: Free Run         Avg Type: Log-	Pwr TRACE 123456 Frequency
IFGain:Low #Atten: 30 dB M 10 dB/div Ref 20.00 dBm	Ikr1 5.820 021 GHz -6.04 dBm
	Center Free 5.82500000 GH
0.00 1 10.0 mman when many marked a marked a marked and a marked	Start Free 5.811687500 GH
20.0	5.838312500 GH
10.0 Norther 10.0	CF Stej 2.662500 MH <u>Auto</u> Ma
50.0	Freq Offse
70.0	
Center 5.82500 GHz #Res BW 100 kHz #VBW 300 kHz Swe	Span 26.63 MHz eep 2.60 ms (1001 pts)
ISG	STATUS

#### Channel 165 – Chain B

Product	:	Access Point
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps)

Channel Number	Frequency (MHz)	Chain	PPSD/MHz (dBm)	BWCF (dB)	Total PPSD/MHz (dBm)1	Required Limit (dBm)	Result	
151	5755	А	-5.820	6.98	4.170	<30	Pass	
151	151 5755	В	-6.210	6.98	3.780	<30	Pass	
150	159 5795	А	-5.220	6.98	4.770	<30	Pass	
159		5795	5795	В	-5.930	6.98	4.060	<30

Note 1: The quantity 10\*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

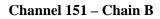


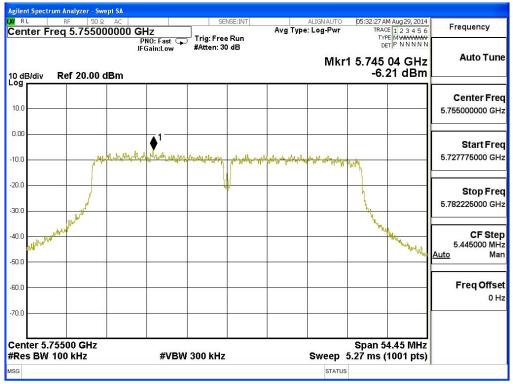
Channel 151 – Chain A



70.0						0 Hz
60.0						Freq Offset
40.0 1470 400 400 400 400 400 400 400 400 400					Mary Poly Marker	CF Step 5.445000 MHz <u>Auto</u> Mar
30.0					Nu -	Stop Frec 5.822225000 GHz
0.00 10.0	WWWWWWWWW	Manghalla	Kulananalananan	Mathanna mangang	~~	Start Fred 5.767775000 GHz
10.0						Center Frec 5.795000000 GHz
0 dB/div Ref 20.00 dB	IFGain:Low	#Atten: 30 d	3	Mkr1	5.784 00 GHz -5.22 dBm	Auto Tune
Center Freq 5.7950000	PNO: Fast 😱	Trig: Free R	un	ALIGNAUTO pe: Log-Pwr	05:43:31 AM Aug 29, 2014 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N	Frequency

Channel 159 – Chain A







		Channel	139 - Cham L	•	
Agilent Spectrum Analyzer - Swej	ot SA				
Center Freq 5.79500		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	05:51:58 AM Aug 29, 2014 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N N	Frequency
10 dB/div Ref 20.00 dl	IFGain:Low	#Atten: 30 dB	Mkr1 {	5.780 067 2 GHz -5.93 dBm	Auto Tune
10.0					Center Fred 5.795000000 GHz
10.0	1 Julight who	man alana alandan	tom and all algebrain as	M Way	Start Free 5.767550000 GH:
30.0		¥			Stop Free 5.822450000 GH:
40.0				mand and an about	CF Step 5.490000 MH <u>Auto</u> Mar
60.0					Freq Offse 0 H
-70.0					
Center 5.79500 GHz #Res BW 100 kHz	#VBW	300 kHz	Sweep	Span 54.90 MHz 5.27 ms (1001 pts)	
MSG			STATU	is	

#### Channel 159 – Chain B

## 5. Radiated Emission

#### 5.1. Test Equipment

The following test equipments are used during the radiated emission test:

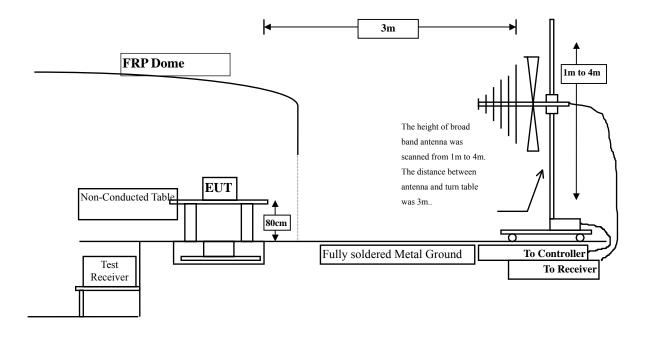
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	Х	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2014
	Х	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2014
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2014
	Х	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
	Х	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2014
	Х	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2014
	Х	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2014
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2014
	Х	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2014
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

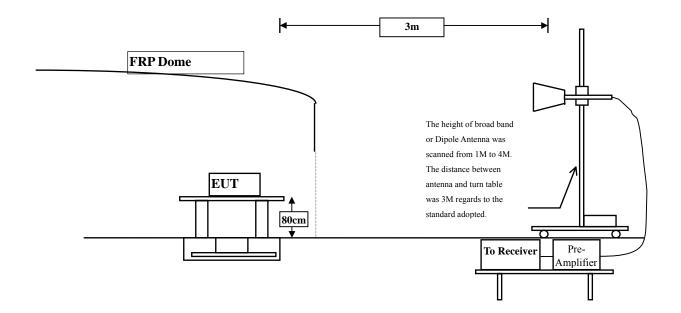
2. The test instruments marked with "X" are used to measure the final test results.

## 5.2. Test Setup

Radiated Emission Below 1GHz



#### Radiated Emission Above 1GHz



## 5.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 S	FCC Part 15 Subpart C Paragraph 15.209(a) Limits					
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)				
0.009-0.490	2400/F(kHz)	300				
0.490-1.705	24000/F(kHz)	30				
1.705-30	30	30				
30-88	100	3				
88-216	150	3				
216-960	200	3				
Above 960	500	3				

Remarks: E field strength  $(dBuV/m) = 20 \log E$  field strength (uV/m)

## 5.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10, 2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas. The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

## 5.5. Uncertainty

- ± 3.8 dB below 1GHz
- ± 3.9 dB above 1GHz

## 5.6. Test Result of Radiated Emission

Product	:	Access Point
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11490.000	15.004	50.343	65.347	-8.653	74.000
17235.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11490.000	15.004	36.130	51.134	-2.866	54.000
Vertical					
<b>Peak Detector:</b>					
11490.000	16.520	52.721	69.241	-4.759	74.000
17235.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
31080.000	*	*	*	*	74.000
36260.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11490.000	16.520	35.828	52.348	-1.652	54.000
Mata					

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

-

Product Test Item	<ul> <li>Access Point</li> <li>Harmonic Radiated Emission Data</li> </ul>							
Test Site	: No.3 OATS							
Test Mode								
		× ×	1 / 1	,				
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Horizontal								
Peak Detector:								
11570.000	15.207	54.337	69.544	-4.456	74.000			
17355.000	*	*	*	*	74.000			
20800.000	*	*	*	*	74.000			
26000.000	*	*	*	*	74.000			
31200.000	*	*	*	*	74.000			
36400.000	*	*	*	*	74.000			
Average								
Detector:								
11570.000	15.207	37.503	52.710	-1.290	54.000			
Vertical								
Peak Detector:								
11570.000	16.573	51.261	67.833	-6.167	74.000			
17355.000	*	*	*	*	74.000			
20800.000	*	*	*	*	74.000			
26000.000	*	*	*	*	74.000			
31200.000	*	*	*	*	74.000			
36400.000	*	*	*	*	74.000			
Average								
Detector:								
11570.000	16.573	35.864	52.436	-1.564	54.000			
NI-4								

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

-

Product Test Item Test Site Test Mode	: No.3 OATS					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
11650.000	13.504	45.638	59.142	-14.858	74.000	
17475.000	*	*	*	*	74.000	
20960.000	*	*	*	*	74.000	
26200.000	*	*	*	*	74.000	
31440000	*	*	*	*	74.000	
36680.000	*	*	*	*	74.000	
Average						
<b>Detector:</b>						
11650.000	13.504	31.365	44.869	-9.131	54.000	
Vertical						
<b>Peak Detector:</b>						
11650.000	14.959	47.473	62.432	-11.568	74.000	
17475.000	*	*	*	*	74.000	
20960.000	*	*	*	*	74.000	
26200.000	*	*	*	*	74.000	
31440000	*	*	*	*	74.000	
36680.000	*	*	*	*	74.000	
Average						
Detector:						
11650.000	14.959	32.501	47.460	-6.540	54.000	
NT /						

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.

3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.

4. Measurement Level = Reading Level + Correct Factor.

5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.

6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item Test Site Test Mode	<ul> <li>Access Point</li> <li>Harmonic Radiated Emission Data</li> <li>No.3 OATS</li> <li>Mode 2: Transmit (802.11n-20BW-14.4Mbps) (5745MHz)</li> </ul>					
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
11490.000	15.004	49.185	64.189	-9.811	74.000	
17235.000	*	*	*	*	74.000	
20720.000	*	*	*	*	74.000	
25900.000	*	*	*	*	74.000	
31080.000	*	*	*	*	74.000	
36260.000	*	*	*	*	74.000	
Average						
Detector:						
11490.000	46.318	33.762	48.766	-5.234	54.000	
Vertical						
Peak Detector:						
11490.000	16.520	48.321	64.841	-9.159	74.000	
17235.000	*	*	*	*	74.000	
20720.000	*	*	*	*	74.000	
25900.000	*	*	*	*	74.000	
31080.000	*	*	*	*	74.000	
36260.000	*	*	*	*	74.000	
Average						
<b>Detector:</b>						
11490.000	16.520	33.857	50.377	-3.623	54.000	

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

-

Product Test Item	<ul> <li>Access Point</li> <li>Harmonic Radiated Emission Data</li> </ul>					
Test Site	No.3 OATS					
Test Mode			n-20BW-14.4Mbps)	(5785MHz)		
1000 111000				(0,0011112)		
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
Peak Detector:						
11570.000	15.207	48.807	64.014	-9.986	74.000	
17355.000	*	*	*	*	74.000	
20880.000	*	*	*	*	74.000	
26100.000	*	*	*	*	74.000	
31320.000	*	*	*	*	74.000	
36540.000	*	*	*	*	74.000	
Average						
<b>Detector:</b>						
11570.000	15.207	33.037	48.244	-5.756	54.000	
Vertical						
Peak Detector:						
11570.000	16.573	47.715	64.287	-9.713	74.000	
17355.000	*	*	*	*	74.000	
20880.000	*	*	*	*	74.000	
26100.000	*	*	*	*	74.000	
31320.000	*	*	*	*	74.000	
36540.000	*	*	*	*	74.000	
Average						
<b>Detector:</b>						
11570.000	16.573	32.572	49.144	-4.856	54.000	
NT /						

Note:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

-

Product Test Item Test Site Test Mode	: No.3 OA	ic Radiated Emiss ATS	sion Data n-20BW-14.4Mbps)	(5825MHz)	
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11650.000	13.504	45.597	59.101	-14.899	74.000
17475.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440.000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11650.000	13.504	30.262	43.766	-10.234	54.000
Vertical					
<b>Peak Detector:</b>					
11650.000	14.959	43.901	58.860	-15.140	74.000
17475.000	*	*	*	*	74.000
20960.000	*	*	*	*	74.000
26200.000	*	*	*	*	74.000
31440.000	*	*	*	*	74.000
36680.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11650.000	14.959	29.053	44.012	-9.988	54.000
3.7					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.

- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item Test Site Test Mode	<ul> <li>Access Point</li> <li>Harmonic Radiated Emission Data</li> <li>No.3 OATS</li> <li>Mode 3: Transmit (802.11n-40BW-30Mbps) (5755MHz)</li> </ul>				
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11510.000	15.044	51.917	66.960	-7.040	74.000
17265.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11510.000	15.044	36.004	51.047	-2.953	54.000
Vertical					
Peak Detector:					
11510.000	16.536	50.885	67.421	-6.579	74.000
17265.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11510.000	16.536	33.286	49.822	-4.178	54.000
Note:					

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

-

Product Test Item Test Site Test Mode	: No.3 O/	ic Radiated Emiss ATS	sion Data n-40BW-30Mbps) (5	795MHz)	
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11590.000	15.364	47.746	63.110	-10.890	74.000
17385.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
11590.000	15.364	31.750	47.114	-6.886	54.000
Vertical					
<b>Peak Detector:</b>					
11590.000	16.687	44.336	61.023	-12.977	74.000
17385.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
Average					
Detector:					
11590.000	16.687	29.925	46.612	-7.388	54.000
N.T					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.

3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.

4. Measurement Level = Reading Level + Correct Factor.

5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.

6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item Test Site Test Mode	<ul> <li>Access Point</li> <li>General Radiated Emission</li> <li>No.3 OATS</li> <li>Mode 1: Transmit (802.11a-6Mbps) (5785MHz)</li> </ul>				
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
<b>Peak Detector</b>					
138.640	-7.519	40.450	32.931	-10.569	43.500
311.300	-4.651	35.303	30.652	-15.348	46.000
468.440	3.544	30.404	33.948	-12.052	46.000
604.240	4.289	36.017	40.307	-5.693	46.000
755.560	5.039	34.153	39.192	-6.808	46.000
881.660	6.789	31.160	37.949	-8.051	46.000
Vertical					
<b>Peak Detector</b>					
179.380	-0.824	36.279	35.455	-8.045	43.500
247.280	-5.519	37.078	31.559	-14.441	46.000
390.840	-0.768	38.864	38.096	-7.904	46.000
499.480	-0.199	34.580	34.380	-11.620	46.000
602.300	1.704	38.740	40.444	-5.556	46.000
755.560	2.829	34.249	37.078	-8.922	46.000

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

Product Test Item Test Site Test Mode	<ul> <li>Access Point</li> <li>General Radiated Emission</li> <li>No.3 OATS</li> <li>Mode 2: Transmit (802.11n-20BW-14.4Mbps) (5785MHz)</li> </ul>				
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$
Horizontal					
<b>Peak Detector</b>					
253.100	-5.669	38.001	32.332	-13.668	46.000
388.900	1.034	38.589	39.623	-6.377	46.000
507.240	2.529	29.914	32.443	-13.557	46.000
621.700	1.817	36.805	38.622	-7.378	46.000
807.940	6.231	30.805	37.036	-8.964	46.000
887.480	6.623	25.224	31.847	-14.153	46.000
Vertical					
Peak Detector					
179.380	-0.824	38.037	37.213	-6.287	43.500
348.160	-0.890	36.233	35.343	-10.657	46.000
509.180	0.804	27.752	28.556	-17.444	46.000
625.580	0.299	36.896	37.196	-8.804	46.000
790.480	2.693	31.793	34.486	-11.514	46.000
953.440	3.015	27.041	30.056	-15.944	46.000
Note:					

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.

3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.

4. Measurement Level = Reading Level + Correct Factor.

5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.

6. The average measurement was not performed when the peak measured data under the limit of average detection.

7. The emission levels of other frequencies are very lower than the limit and not show in test report.

8. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	Access Point
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps) (5755MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	$dB\mu V/m$
Horizontal					
<b>Peak Detector</b>					
286.080	-5.619	41.175	35.556	-10.444	46.000
433.520	0.841	32.221	33.062	-12.938	46.000
544.100	4.373	24.073	28.446	-17.554	46.000
658.560	1.892	39.210	41.102	-4.898	46.000
747.800	3.915	34.915	38.830	-7.170	46.000
889.420	6.654	27.210	33.864	-12.136	46.000
Vertical					
<b>Peak Detector</b>					
				<	

177.440	-1.248	37.893	36.645	-6.855	43.500
342.340	-0.936	42.229	41.293	-4.707	46.000
497.540	-0.713	33.460	32.747	-13.253	46.000
610.060	2.087	37.923	40.010	-5.990	46.000
749.740	2.023	32.294	34.317	-11.683	46.000
825.400	3.016	32.865	35.881	-10.119	46.000

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

# 6. Band Edge

## 6.1. **Test Equipment**

### **RF Radiated Measurement:**

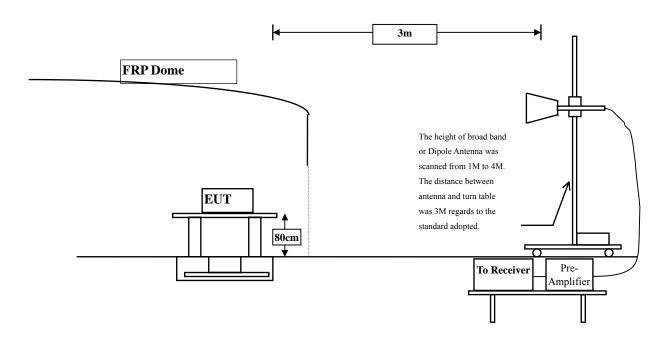
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2014
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2014
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2014
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2014
	Х	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2014
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2014
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2014
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2014
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All instruments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

# 6.2. Test Setup



# 6.3. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits					
Frequency MHz	uV/m @3m	dBuV/m@3m			
30-88	100	40			
88-216	150	43.5			
216-960	200	46			
Above 960	500	54			

Remarks : 1. RF Voltage  $(dBuV) = 20 \log RF$  Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

## 6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

In emission tests the measurement antenna is used to detect the field from the UUT in one stage of the measurement, and from the substitution antenna in the other stage, The substitution antenna shall be used to replace the equipment under test in substitution measurements, using the above method to obtain the EIRP.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

# 6.5. Uncertainty

- $\pm$  3.8 dB below 1GHz
- ± 3.9 dB above 1GHz

# 6.6. Test Result of Band Edge

Product	:	Access Point
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)-Channel 149

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Horizontal	5715.000	-36.240	-9.240	-27.000	Pass
Horizontal	5725.000	-26.041	-9.041	-17.000	Pass

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5715.000	-34.220	-7.220	-27.000	Pass
Vertical	5725.000	-27.881	-10.881	-17.000	Pass

Product	:	Access Point
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps)-Channel 165

	FrequencyMeasure LevelMargin(MHz)(dBm/m)(dB)		Limit (dBm/m)	Result	
Horizontal	5850.000	-37.540	-20.540	-17.000	Pass
Horizontal	5860.000	-39.012	-12.012	-27.000	Pass

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5850.000	-35.841	-18.841	-17.000	Pass
Vertical	5860.000	-33.122	-6.122	-27.000	Pass

Product	:	Access Point
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps) -Channel 149

	Frequency (MHz)	requency Measure Level Margin (MHz) (dBm/m) (dB)		Limit (dBm/m)	Result
Horizontal	5715.000	-37.033	-10.033	-27.000	Pass
Horizontal	5725.000	-28.431	-11.431	-17.000	Pass

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5715.000	-36.744	-9.744	-27.000	Pass
Vertical	5725.000	-28.340	-11.340	-17.000	Pass

Product	:	Access Point
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps) -Channel 165

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Horizontal	5850.000	-36.711	-19.711	-17.000	Pass
Horizontal	5860.000	-39.860	-12.860	-27.000	Pass

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5850.000	-36.224	-19.224	-17.000	Pass
Vertical	5860.000	-39.533	-12.533	-27.000	Pass

Product	:	Access Point
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps) -Channel 151

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Horizontal	5715.000	-28.536	-1.536	-27.000	Pass
Horizontal	5725.000	-19.023	-2.023	-17.000	Pass

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5715.000	-27.833	-0.833	-27.000	Pass
Vertical	5725.000	-19.870	-2.870	-17.000	Pass

Product	:	Access Point
Test Item	:	Band Edge Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps) -Channel 159

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Horizontal	5850.000	-38.044	-21.044	-17.000	Pass
Horizontal	5860.000	-39.533	-12.533	-27.000	Pass

	Frequency (MHz)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5850.000	-34.866	-17.866	-17.000	Pass
Vertical	5860.000	-37.430	-10.430	-27.000	Pass

# 7. Occupied Bandwidth

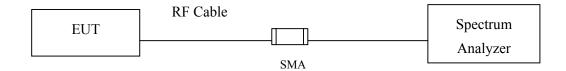
### 7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

### Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

# 7.2. Test Setup



## 7.3. Limits

For the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

# 7.4. .Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

## 7.5. Uncertainty

 $\pm$  150Hz

# 7.6. Test Result of Occupied Bandwidth

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	16400	>500	Pass

Figure	Channel	149:
--------	---------	------

RL RF 50Ω AC		SENSE:INT		ALIGN AUTO	04:07:37 AM /	Aug 29, 2014	-
nter Freq 5.745000000	PNO: East	Trig: Free Run #Atten: 30 dB	Avg Type:	Log-Pwr	TYPE	1 2 3 4 5 6 M <del>WWWW</del> P N N N N N	Frequency
dB/div Ref 20.00 dBm				Mkr2	2 5.736 7 -7.2	0 GHz 9 dBm	Auto Tu
0	1						Center Fr
0	2)	and all all all all all all all all all al	unerman 3			-7.25 dBm	5.745000000 G
0	work		hard			I	Start Fr
0 0				Sound and and and and and and and and and a	Due -		5.72000000 G
0 ageneration and a fundamental and a					un physical and a second	NTW-Sak Bigger	
0							<b>Stop Fr</b> 5.770000000 G
nter 5.74500 GHz es BW 100 kHz	#VBW 3	100 kHz		Sweep 4	Span 50. I.80 ms (10		CF St 5.000000 M
	7 75 GHz	-1.25 dBm	FUNCTION FUN	CTION WIDTH	FUNCTION	VALUE	Auto N
	5 70 GHz 3 30 GHz	-7.29 dBm -8.82 dBm					Freq Offs
							0

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	16500	>500	Pass

# Figure Channel 157:

gilent Spectrum Analyzer - Sw RL RF 50 G		SENSE:INT	ALIGN AUTO	04:16:13 AM Aug 29, 2014	
Center Freq 5.7850	00000 GHz		Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
	PNO: Fast Ģ IFGain:Low	Trig: Free Run #Atten: 30 dB		DET P N N N N N	Auto Tun
0 dB/div Ref 20.00	dBm		Mkr	2 5.776 70 GHz -8.70 dBm	Auto Tun
10.0		<b>^1</b>			Center Fre
0.00	2 	mannow more	and 3	-8.21 dBm	5.785000000 GH
20.0	لمر				
30.0	- Anna Jon		North Contraction		Start Fre 5.76000000 GI
40.0 50.0 Julyhan allower Whole work	a barren alar		#ەلىمىر	Why min the watche assess	0.7000000000
50.0					Stop Fre
70.0					5.81000000 GI
enter 5.78500 GHz				Span 50.00 MHz	CF Ste
Res BW 100 kHz		V 300 kHz		4.80 ms (1001 pts)	5.000000 MI
1 N 1 f	× 5.780 25 GHz	-2.21 dBm	JNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
2 N 1 f 3 N 1 f 4	5.776 70 GHz 5.793 25 GHz	-8.70 dBm -8.37 dBm			Freq Offs
5					01
7 8					
9 10					
11 12					
SG			STATUS		

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	16450	>500	Pass

# Figure Channel 165:

RL RF 50Ω AC		SENSE:INT	ALIGN AUTO	04:23:55 AM Aug 29, 2014	_
enter Freq 5.8250000	00 GHz		Avg Type: Log-Pwr		Frequency
· · · ·	PNO: Fast C	Trig: Free Run #Atten: 30 dB		DET P N N N N N	
			Mk	r2 5.816 65 GHz	Auto Tun
0 dB/div Ref 20.00 dBm	I			-12.33 dBm	
10.0		0.1			Center Fre
0.00		(). I	3		5.825000000 GH
10.0	2 mm	and margin marging	monent	-8.84 dBm	
20.0					
30.0	and		Nu ha		Start Fre
40.0	Martin		None and No.		5.80000000 G
50.0 Annalesalesalesalesalesalesalesalesalesales				man where the spectra operation	
50.0				in the second	Stop Fr
70.0					5.85000000 G
enter 5.82500 GHz				Span 50.00 MHz	
Center 5.82500 GHz Res BW 100 kHz	#VB	W 300 kHz	Sweep	Span 50.00 MHz 4.80 ms (1001 pts)	CF Ste
Center 5.82500 GHz Res BW 100 kHz	<	Y	Sweep	4.80 ms (1001 pts)	CF Ste 5.000000 MI
enter 5.82500 GHz Res BW 100 kHz	5.820 25 GHz	-2.84 dBm -12.33 dBm		4.80 ms (1001 pts)	CF Ste 5.000000 M
Image: Section of the sectio	5.820 25 GHz	Y -2.84 dBm		4.80 ms (1001 pts)	CF Ste 5.000000 M <u>Auto</u> M
Image: section of the sectio	5.820 25 GHz	-2.84 dBm -12.33 dBm		4.80 ms (1001 pts)	CF Sta 5.000000 M <u>Auto</u> M Freq Offs
Res         BW         100 kHz           I         N         1         f           2         N         1         f         5           3         N         1         f         5           4         4         5         5	5.820 25 GHz	-2.84 dBm -12.33 dBm		4.80 ms (1001 pts)	CF Sta 5.000000 M <u>Auto</u> M Freq Offs
Center 5.82500 GHz Res BW 100 kHz 1 N 1 f 5 3 N 1 f 5 3 N 1 f 5 4 5 6 6 7 8	5.820 25 GHz	-2.84 dBm -12.33 dBm		4.80 ms (1001 pts)	CF Ste 5.000000 Mi <u>Auto</u> Mi Freq Offs
enter 5.82500 GHz Res BW 100 kHz 1 N 1 f 5 3 N 1 f 5 4 5 6 6 7 8 9 9	5.820 25 GHz	-2.84 dBm -12.33 dBm		4.80 ms (1001 pts)	CF Sta 5.000000 M <u>Auto</u> M Freq Offs
Kenter 5.82500 GHz           Res BW 100 kHz           Kin Model Tric Scut           N         1         f         5           N         1         f         5           S         1         f         5           G         6         6         7           R         8         8         8	5.820 25 GHz	-2.84 dBm -12.33 dBm		4.80 ms (1001 pts)	CF Ste 5.000000 Mi

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps) (5745MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	17600	>500	Pass

#### 04 RL № 1/10 8/ Center Freq 5.745000000 GHz INIC: Last G IFGein:Low #Atten: 30 dB TRACE 1 2 0 4 5 6 TYPE MYNNNN N Frequency Avg Type: Log-Pwr Auto Tune Mkr2 5.736 10 GHz -8.10 dBm 10 dB/div Ref 20.00 dBm 10 Center Freq 5.74500000 GHz U.L Annah -0.00 dt 10. -20.0 Start Freq 30.0 5.720000000 GHz 40.0 5U.L Stop Freq 5.770000000 GHz 60 N -70 r Center 5.74500 GHz #Res BW 100 kHz Span 50.00 MHz Sweep 4.80 ms (1001 pts) CF Step 5.000000 MHz Man #VBW 300 kHz <u>N35</u> SCL 1 N 1 f 2 N 1 f 3 N 1 f -2.08 dBm -8.10 dBm -8.60 dBm 6.740 00 GHz 5.736 10 GHz 6.753 85 GHz Freq Offset 0 Hz STATUS

### Figure Channel 149: (Chain A)

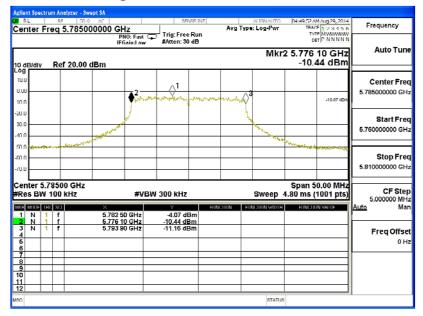
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745.00	17750	>500	Pass

### Figure Channel 149: (Chain B)

q 5.74500									Frequency
	PN	Z D:Fast 🖕 nin:Inw	Trig: Free #Atten: 30	Run d⊟	Avg Typ	e: Log-Pwr	TYP	F 123456 F MWWWWW F P N N N N N	
Ref 20.00 d	IBm					Mkr			Auto T
				- 1					Center
		€ <sup>2</sup>	- weeksterne	~~~ <u>~</u>	en ma	3		11.27 dUm	5.745000000
			1		ι 4				Start
	and ward					Very and a second			5.720000000
Constructed and	M .						hal a sample and	mand	Stop
									5.770000000
500 GHz J0 kHz		#VBV	/ 300 KHz			Sweep 4			CF : 5.000000
sii f	×	GHz	-5.27 dB		HIN H	NCI IN WOTH	FUNCTI	IN VALTIE	Auto
f f			-12.43 dB -11.83 dB	im Im					Freq O
				_				=	
	500 GHz 500 GHz 50 f	Ref 20.00 dBm	Ref 20.00 dBm	Ref 20.00 dBm	Ref 20.00 dBm	Ref 20.00 dBm	Kef 20.00 dBm         Mkr/s           2         1           3         1           4         2           500 GHz         500 GHz           90 kHz         #VBW 300 kHz         Sweep 4           5,738 10 GHz         5,27 dBm           5,738 10 GHz         5,27 dBm	Mkr2 5.736 Ref 20.00 dBm -12.4	Mkr2 5.736 10 GHz           Ref 20.00 dBm         -12.43 dBm           -12.43 dBm         -12.43 dBm

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps) (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	17700	>500	Pass



# Figure Channel 157: (Chain A)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157	5785.00	16450	>500	Pass

Figure Channel 157: (Chain B)

		™ <u>50 x</u> 1 5.78500	AC	IZ		Avg T	ALIGN AUTO ype: Log-Pwr	IRAC	MAug29,2014 * 1 2 3 4 5 6	Frequency
		0.110000	PI	NO: Fast ( Saln:Low	Trig: Free Ru #Atten: 30 dE			TYP		
0 dB/dI	iv R	ef 20.00 d	1Bm				Mkr		10 GHz 28 dBm	Auto Tur
.og 10.0										Center Fre
0.00				<b>a</b> 2	<b>∆</b> <sup>1</sup>		. 3			5.785000000 GH
inn				\$ when	hours	and a second	<b>^1</b>		-11.15 dDm	
0.0				/			1			Start Fre
			1 America				ma.			5.76000000 GH
		ماريد	2 and the second				Name of Street	105		
0.0	الرقمة يوهونكرا	C. Selfer						- a. 12.	a sea a secondo	Stop Fre
/0.0										5.81000000 GH
L										
	5.785 SW 10	500 GHz 0 kHz		#VBI	W 300 kHz		Sweep		0.00 MHz 1001 pts)	CF Ste 5.000000 MH
	E TRU S		×		Y		FUNCTION WIDTH	FUNCTU	IN VALUE	Auto Ma
	111	f f	5.780 0 6.776 1	0 GHz	-5.15 dBm -12.28 dBm					
1 N 2 N					-11.28 dBm					Freq Offs
1 N		f	5.7938	5 GHz	-11.20 ubiii					
1 N 2 N 3 N 4 5		f	5.793 8	5 GHz	-11.20 ubiii					01
1 N 3 N 4 5 6 7		f	5.793 8	5 GHz	11.20 0.011					01
1 N 3 N 4 5 6 7 8 9		f	5.793 8	5 GHz	-11.20 ubii					01
1 N 3 N 4 5 6 7 8		f	5.793 8	5 GHz	•11.20 UBII					01

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit (802.11n-20BW-14.4Mbps) (5825MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	17700	>500	Pass

	8***		· · <b>· ·</b> ·	,		
gilent Spectrum Analyzer - Swe						
enter Freq 5.82500	AC 0000 GHz PN0: Fast (	SENSE:INT	ALIGN AUT Avg Type: Log-Pw	TRACE	uu 20, 2014 2 3 4 5 6 7 N N N N N	Frequency
	II Gain:Low	#Atten: 30 dB	м	kr2 5.816 10		Auto Tu
0 dB/div Ref 20.00 d	Bm				dBm	
00					[	Center F
nn 	2/1 2/1	way way	mar and 3		-11 27 dBm	5.825000000
0.0						Start F
0.0	and the second se					5.800000000
I.U areadown and the second				and a subscription of the second	mould	
0.0						Stop F 5.85000000
enter 5.82500 GHz				Span 50.		
Res BW 100 kHz	#VB	W 300 kHz	Sweet	5 4.80 ms (10		CF 8 5.000000 I
	X 5,817 50 GHz	ĭ -5.27 dBm	FUNCTION FUNCTION WIE	TII FUNCTION V	ALUE	Auto
2 N 1 F 3 N 1 F	5.816 10 GHz 5.833 90 GHz	-12.09 dBm -11.70 dBm				Freq Of
5				_		(
7						
0						
1						
a			SIA	IUS		

### Figure Channel 165: (Chain A)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165	5825.00	17700	>500	Pass

# Figure Channel 165: (Chain B)

	0				
gilent Spectrum Analyzer Sw	ept SA				
RF 50 Q Center Freq 5.82500	AC DOODO GHz PNO: Fast G	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	05:13:13 AM Aug 20, 2011 TRACE 1 2 3 4 5 6 TYPE M	Frequency
0 dB/div <b>Ref 20.00</b>	II Gain:Luw	#Atten: 30 dB	Mkr	2 5.816 15 GHz -11.80 dBm	Auto Tu
og Inn Inn	2 2	1	3	.M Aldin	Center Fr 5.825000000 G
0.0 0.0					<b>Start Fr</b> 5.80000000 G
U.U 0.0 0.0				hand the second second	Stop Fr 5.85000000 G
enter 5.82500 GHz Res BW 100 kHz	#VB\	V 300 kHz	Sweep 4	Span 50.00 MHz 4.80 ms (1001 pts)	CF St 5.000000 M
KN MODE THE SEL	Х		UNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto N
1 N 1 f 2 N 1 f 3 N 1 f 4	5.820 05 GHz 5.816 15 GHz 5.833 90 GHz	-5.77 dBm -11.80 dBm -12.97 dBm			Freq Offs
5 6 7					0
8 9 0					
3/3			STATUS		

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps) (5755MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	36500	>500	Pass

#### AN RL RE INTO AL Center Freq 5.755000000 GHz IND: Lwt Freq Strip Free Run IFGeinLuw Atten: 30 dB TRACE 1 2 0 4 5 6 TYPE MYNNNN N Frequency Avg Type: Log-Pwr Auto Tune Mkr2 5.736 7 GHz -12.66 dBm 10 dB/div Ref 20.00 dBm 10 Center Freq 5.75500000 GHz \_\_\_1 U.L **▲**<sup>2</sup> 10. -11.07 ( -20.0 Start Freq 30.0 5.70500000 GHz 40.0 50. Stop Freq 5.80500000 GHz 60 N -70 r Center 5.75500 GHz #Res BW 100 kHz Span 100.0 MHz Sweep 9.60 ms (1001 pts) CF Step 10.000000 MHz 0 Man #VBW 300 kHz <u>N35</u> SCI 1 N 1 f 2 N 1 f 3 N 1 f -5.07 dBm -12.66 dBm -11.27 dBm 6.748 7 GHz 5.736 7 GHz 6.773 1 GHz Freq Offset 0 Hz STATUS

### Figure Channel 151: (Chain A)

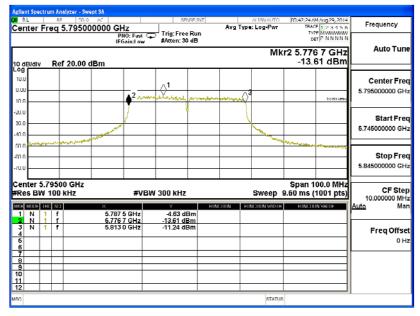
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	36600	>500	Pass

### Figure Channel 151: (Chain B)

Agilent Spectrum Analyzer - Sw					
Center Freq 5.75500	DOOOD GHz PNO: Fast G	SENSE:INT	Aug Type: Log-Pwr	15:31:22 AM Aug 29, 2014 TBACF 1 2 3 4 5 6 TYPE MONOMOUND DET P NNNNN	Frequency
10 dB/dly Ref 20.00 (	IFGain:Low	#Atten: 30 dB	Mk	r2 5.736 7 GHz -15.50 dBm	Auto Tune
	▲ <sup>2</sup> ····	1		-12.57 dBn	Center Fre 5.755000000 GH
20.0 30.0 40.0		¥	- Contraction of the second se		Start Fre 5.705000000 GH
รักก <b>คงหัน</b>					Stop Fre 5.805000000 G⊦
Center 5.75500 GHz Res BW 100 kHz	×		Sweep §	Span 100.0 MHz 9.60 ms (1001 pts) ENVIRON/VSDDF	CF Ste 10.000000 M⊦ <u>Auto</u> Ma
1 N 1 F 2 N 1 F 3 N 1 F 4 5 6	5.743 8 GHz 5.736 7 GHz 5.773 0 GHz	-6.67 dBm -15.50 dBm -13.16 dBm			Freq Offs
7 8 9 10 11 12					
80			STATUS		

Product	:	Access Point
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 3: Transmit (802.11n-40BW-30Mbps) (5795MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	36600	>500	Pass



# Figure Channel 159: (Chain A)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	36600	>500	Pass

### Figure Channel 159: (Chain B)

	-				
Aglient Spectrum Analyzer - Sv					
Center Freq 5.7950	2 AC     000000 GHz PN0: Fast (	Trig: Free Run	Avg Type: Log-Pwr	05:50:53 AM Aug 29, 2014 INACE 1 2 3 4 5 6 TYPE MULLINU	Frequency
	IFGain:i ow	#Atten: 30 dB	Mk	r2 5.776 7 GHz	Auto Tune
10 dB/div Ref 20.00	dBm			-15.25 dBm	
10.0 10.0 10.0	¢2~~~	1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-12 54 (Fin	Center Freq 5.795000000 GH2
-10.0					Start Free 5.745000000 GH:
-10.0 -50.0	walk Mark			and the second states of the second sec	Stop Free
-/0.0					5.845000000 GH:
Center 5.79500 CHz Span 100.0 MHz Sweep 9.60 ms (1001 pts)					CF Ste 10.000000 MH
MKR MODE TRC SCL 1 N 1 f 2 N 1 f	× 5.786 3 GHz 5.776 7 GHz	-6.54 dBm -16.25 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mai
3 N 1 f 4 5	5.813 3 GHz	-14.34 dBm			Freq Offse
6 7 8					
9 10 11					
12 MSG			SIAIUS	;	

# 8. Frequency Stability

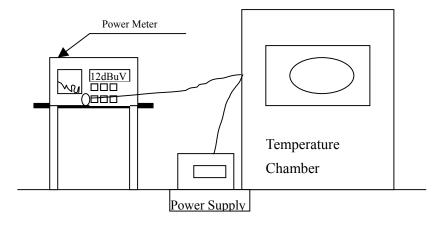
### 8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

### Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

# 8.2. Test Setup



## 8.3. Limits

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified

## 8.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

# 8.5. Uncertainty

± 150 Hz

# 8.6. Test Result of Frequency Stability

Product	:	Access Point
Test Item	:	Frequency Stability
Test Site	:	Temperature Chamber
Test Mode	:	Carrier Wave

### Chain A

Test Conditions		Channel	Frequency	Frequency	△F (MHz)
		1.40	(MHz)	(MHz)	0.0100
		149	5745.0000	5745.0123	-0.0123
		155	5775.0000	5775.0094	-0.0094
Tnom (20) °C	Vnom (120)V	157	5785.0000	5785.0096	-0.0096
		159	5795.0000	5795.0094	-0.0094
		165	5825.0000	5825.0092	-0.0092
		149	5745.0000	5745.0110	-0.0110
		155	5775.0000	5775.0101	-0.0101
Tmax (50) °C	Vmax (138)V	157	5785.0000	5785.0096	-0.0096
		159	5795.0000	5795.0089	-0.0089
		165	5825.0000	5825.0088	-0.0088
	Vmin (102)V	149	5745.0000	5745.0110	-0.0110
		151	5755.0000	5755.0082	-0.0082
Tmax (50) °C		157	5785.0000	5775.0101	-0.0101
		159	5795.0000	5785.0096	-0.0096
		165	5825.0000	5795.0089	-0.0089
Tmin (0) °C	Vmax (138)V	149	5745.0000	5745.0109	-0.0109
		151	5755.0000	5755.0092	-0.0092
		157	5785.0000	5785.0089	-0.0089
		159	5795.0000	5795.0083	-0.0083
		165	5825.0000	5795.0083	-0.0083
Tmin (0) °C	Vmin (102)V	149	5745.0000	5745.0109	-0.0109
		151	5755.0000	5755.0092	-0.0092
		157	5785.0000	5785.0089	-0.0089
		159	5795.0000	5795.0083	-0.0083
		165	5825.0000	5825.0081	-0.0081

Chain B
---------

liani d					
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	△F (MHz)
		149	5745.0000	5745.0099	-0.0099
		151	5755.0000	5755.0103	-0.0103
Tnom (20) °C	Vnom (120)V	157	5785.0000	5785.0103	-0.0103
		159	5795.0000	5795.0094	-0.0094
		165	5825.0000	5825.0086	-0.0086
		149	5745.0000	5745.0103	-0.0103
		151	5755.0000	5755.0101	-0.0101
Tmax (50) °C	Vmax (138)V	157	5785.0000	5785.0099	-0.0099
		159	5795.0000	5795.0090	-0.0090
		165	5825.0000	5825.0091	-0.0091
Tmax (50) °C	Vmin (102)V	149	5745.0000	5745.0103	-0.0103
		151	5755.0000	5755.0101	-0.0101
		157	5785.0000	5785.0099	-0.0099
		159	5795.0000	5795.0090	-0.0090
		165	5825.0000	5825.0091	-0.0091
Tmin (0) °C	Vmax (138)V	149	5745.0000	5745.0094	-0.0094
		151	5755.0000	5755.0097	-0.0097
		157	5785.0000	5785.0091	-0.0091
		159	5795.0000	5795.0084	-0.0084
		165	5825.0000	5825.0083	-0.0083
Tmin (0) °C	Vmin (102)V	149	5745.0000	5745.0094	-0.0094
		151	5755.0000	5755.0097	-0.0097
		157	5785.0000	5785.0091	-0.0091
		159	5795.0000	5795.0084	-0.0084
		165	5825.0000	5825.0083	-0.0083

# 9. EMI Reduction Method During Compliance Testing

No modification was made during testing.